THE *ELACHISTA REGIFICELLA* SIRCOM COMPLEX (LEP.: ELACHISTIDAE) IN BRITAIN

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Abstract

Elachista regificella (Lep.: Elachistidae) was recently shown to be a species complex. In this paper the occurrence of the three constituent species, *E. regificella* Sircom, *E. geminatella* (H.–S.) and *E. tengstromi* Kaila *et al.*, in Britain, is outlined. Diagnostic characters are given for each species. Life history records indicate that the species have, at least to some extent, different host plant preferences: *Luzula sylvatica* is recorded as the host plant of *E. regificella* and *E. geminatella*, the latter probably exploiting other host plants as well. *L. pilosa* is the only known host plant of *E. tengstromi* in Europe.

Introduction

Elachista regificella Sircom has long been considered to be an easily identified and widespread species in Europe. It has a striking appearance with a characteristic pattern of four silvery golden markings on its shiny blackish brown forewing: a fascia near the base, an 8-shaped spot in the middle, an elongate triangular spot at the tornus and a similar spot at the apex. The antenna of the female is white in the distal third (Traugott-Olsen & Nielsen, 1977; Bland, 1996). The larval mine is also easy to recognise as being the sole '*Phyllonorycter*-type' mine on *Luzula* species, i.e. exhibiting longitudinal folds on the epidermis (Steuer, 1980; Traugott-Olsen & Nielsen, 1977; Bland & Knill-Jones, 1988). Recently Kaila *et al.* (2001) showed that *E. regificella* auctt. is a species complex, and recognised three species as occurring in Europe: *E. regificella* Sircom, *E. geminatella* (Herrich-Schäffer) and *E. tengstromi* Kaila *et al.* All of them also occur in Britain. In this paper we summarise their identification and occurrence here. The paper by Kaila *et al.* (*op. cit.*) can be consulted for further details of the history of the nomenclature, identification, and distribution records outside the British Isles.

Identification of the species

There appear to be slight differences in the external appearance of the three species, but due to individual variation considerable overlap exists between them. Thus a safe identification of the species will usually require the study of the genitalia, except, perhaps, in the most typical specimens, or if life history data are available. All three species possess specific characters in both the male and female genitalia. The best diagnostic characteristics in the male genitalia are the shape of the aedeagus and the cornutus within it. In the female genitalia, the best diagnostic characters for distinguishing the three species are the absolute and relative lengths of the

colliculum, the posterior dilatation and the tubular anterior part of the ductus bursae. The identification is explained under the diagnoses of the species below.

***Elachista regificella* Sircom**

Plate F. Top row: left ♂, right ♀

Elachista regificella Sircom, 1849: 42

Diagnosis. – Wingspan 8.5-9.9 mm. *E. regificella* seems to vary less in size than the other species, the specimens studied being as large as the largest representatives of the others. It tends to have narrower costal and tornal spots as compared with the other species, the costal spot being crescent-shaped versus its triangular or subquadrate shape in *E. geminatella* and *E. tengstromi.* In the male genitalia (Fig. 1) the valva is slightly longer than that of *E. geminatella*: the ratio of the length of valva to that of aedeagus is on average 1.3 (n = 6). The aedeagus (Fig. 2) is similar in shape to that of *E. tengstromi*, lacking a ventrolateral swelling; the cornutus is broader than that of *E. tengstromi* and slightly narrower than that of *E. geminatella.* The female genitalia (Fig. 7) are characterised by a very long ductus bursae, coiled anteriorly, and having a small posterior dilatation. The length of the dilatation, measured from the inception of the ductus seminalis, is equal to the length of the apophyses posteriores, and contains a small group of spines posteriorly, and sometimes an indistinct sclerotised longitudinal ridge. In this species the total length of the ductus bursae (including colliculum) is usually longer than in the other species with, however, some overlap: it is 6.5-7.5 times the length of the apophyses posteriores. The tubular anterior part is longer than in the other species due to the smaller size of the posterior dilatation.

Biology. – Bland & Knill-Jones (1988) and Bland (1996) give a detailed account of the biology of this species. It occurs in fairly open woodland where its foodplant *Luzula sylvatica* grows on sunny banks. The species is univoltine, occurring in July. The larva hatches in September or October, and is fully fed by mid-May to early June. The mature mine is long and inflated, with the upper epidermis puckered, thus distorting the leaf. The larva frequently vacates the mine and forms a new one in another leaf. Records from *Luzula pilosa* almost certainly refer to *E. tengstromi.*

Distribution. To date it has been confirmed as occurring only in the south-west of England from Cornwall, Devon, Gloucestershire and Wiltshire; in Wales from Monmouthshire and in the east of Scotland from Berwickshire, Fifeshire, Kincardineshire and Aberdeenshire. It is probable that most, if not all, the records from or associated with *Luzula sylvatica* in the British Isles will, when specimens are dissected, turn out to be this species. It has not been recorded from any other country yet, but it is highly probable that, when specifically searched for, it will be found to occur in many western European countries.

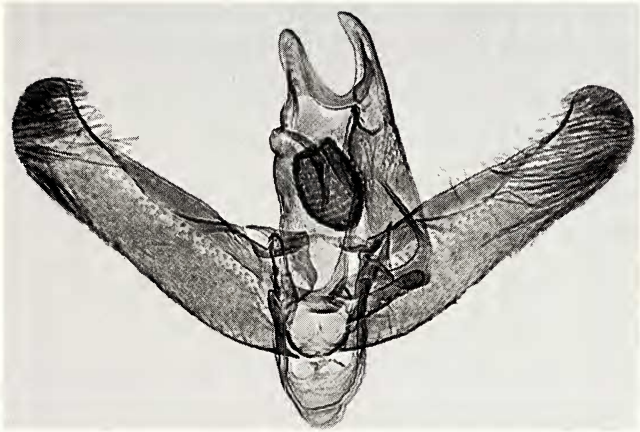

Fig. 1. *Elachista regificella* Sircom. ♂ genitalia (U.K., Wales, Tintern, Monmouthshire, E. C. Pelham-Clinton leg., L. Kaila prep.no. 2953).

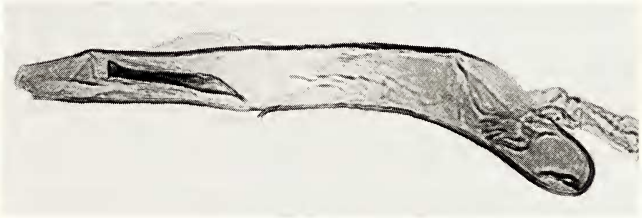

Fig. 2. *Elachista regificella* Sircom. aedeagus.

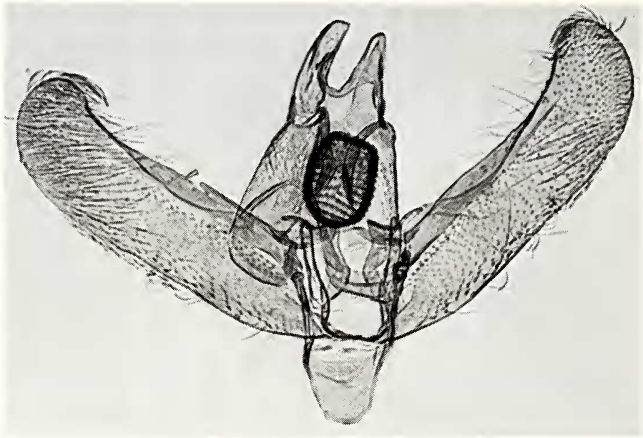

Fig. 3. *Elachista geminatella* (Herrich-Schäffer). ♂ genitalia (Germany, nr. Bonn, Hering leg., L. Kaila prep.no. 2985).

Fig. 4. *Elachista geminatella* (Herrich-Schäffer). aedeagus

***Elachista geminatella* (Herrich-Schäffer)**

Plate F: Middle row: left ♂, right ♀

Poeciloptilia geminatella Herrich-Schäffer, 1855: 301, 309
?Elachista magnificella sensu Zeller, 1847: 891, *nec* Duponchel, 1843
Elachista nieukerkeni Traugott-Olsen, 1995: 366

Diagnosis. – Wingspan 7.8-9.6 mm. Most specimens are characterised by the costal and tornal spots being situated somewhat closer to each other than in *E. regificella* and *E. tengstromi.* This characteristic is not, however, constant and cannot be used as a criterion for identification. In the male genitalia (Fig. 3) the aedeagus (Fig. 4) has a characteristic ventrolateral swelling which, however, is easily hidden if the aedeagus is not mounted correctly; this feature is not present in either *E. tengstromi* or *E. regificella.* The cornutus is broader than in the other species, that of *E. regificella* being somewhat narrower and that of *E. tengstromi* considerably narrower. The valva is somewhat shorter than that of *E. regificella*: the ratio of the length of valva to that of aedeagus is on average 1.1 (n = 11). The female genitalia (Fig. 8) have a characteristic very large and distinctly sclerotised posterior dilatation of the ductus bursae. The length of the dilatation is nearly twice as long as the apophyses posteriores. The posterior group of spines in the dilatation is situated in a well defined sclerotised plate fused to a strongly sclerotised longitudinal ridge. This ridge contains either a few prominent thorns or a long row of smaller teeth. The total length of the ductus bursae (including colliculum) is about 5.5 times the length of the apophyses posteriores (n = 11) and has a few coils anteriorly.

Biology. – It occurs in dry, sunny calcareous meadows, and although it has been reared from *Luzula sylvatica* Hudson (Gaudin) in Germany by Hering, in Latvia and Sweden and in the only known British locality, *L. sylvatica* does not occur. It is possible that either *L. campestris* (L.) DC. or *L. multiflora* (Ehrh.) Lej. could be the host plant in these localities, but searches for larvae have been unsuccessful thus far. In Germany, mines were found in late May and early June. The moth flies from late June to early August.

Distribution. The only known British specimens were all taken by Lord Walsingham at Merton, Norfolk in the latter part of the 19th century; probably in the extensive grounds of Merton Hall where he lived. On the Continent it has been recorded throughout western Europe from Spain to Sweden.

***Elachista tengstromi* Kaila, Bengtsson, Šulcs & Junnilainen**

Plate F: bottom row: left ♂, right ♀

Elachista magnificella Tengström, [1848] 1847: 147, *nec* Duponchel, 1843 [homonym]
Elachista tengstromi Kaila, Bengtsson, Šulcs & Junnilainen, 2001: 164

Diagnosis. – Wingspan 7.0-9.3 mm. The tornal spot of the female is usually more broadly triangular than in *E. geminatella* and *E. regificella*, sometimes even being a

Plate F. *Elachista* spp. Top row: *E. regificella* Sircom left ♂, right ♀; middle row: *E. geminatella* (Herrich-Schäffer) left ♂, right ♀; bottom row: *E. tengstromi* Kaila *et al.* left ♂, right ♀ (Painted by B. Å. Bengtsson, originally published in Kaila *et al.* 2001).

broad, roundish spot, and the median fascia tends to be slightly larger and more regularly 8-shaped. In the structure of the male genitalia (Fig. 5) it is readily distinguished from the other species by the very narrow cornutus in the aedeagus (Fig. 6). It usually also has a rather more produced and oblique cucullus than in the others. In the female genitalia (Fig. 9), the colliculum, as interpreted to be the part of the ductus bursae situated between the ostium bursae and the inception of ductus seminalis, is significantly longer than in the other two species which do not differ from each other in this respect. The ratio of the length of apophyses posteriores to that of colliculum is on average 0.5 (n = 12), the average being 0.3 in the other species with no overlap with *E. tengstromi* (n = 11 for *E. geminatella*, 5 for *regificella*). The length of the posterior dilatation is 1.3 times longer than the apophyses posteriores and is similar to that in *E. regificella* but has a more distinctive longitudinal sclerotised ridge with a few spines anteriorly. The total length of the ductus bursae (including colliculum) is on average 5.5 times the length of the apophyses posteriores (n = 12) and is straight, with no spiral coils.

Biology. – The species has been recorded only on *Luzula pilosa* L. (Willd.) in Europe. Steuer (1980) gives a thorough outline of the biology of this species (as *regificella*). In Finland mines of *E. tengstromi* can be found at any time of the year, but most commonly the species hibernates as a small larva. In spring it develops slowly until early – mid-June. Larvae can be found in leaves of *Luzula pilosa* growing in semi-shade or open places, often together with *E. gleichenella* (Fabricius) in open and *E. trapeziella* (Stainton) in more shady sites. Adults have been recorded from mid-June to late August, the peak being around mid-July.

Distribution. Confirmed records from England are from Kent, Hampshire and Oxfordshire, from Monmouthshire in Wales and Morayshire in Scotland. Abroad, the species is known from Switzerland and Austria northwards through Germany and Denmark to Fennoscandia and eastwards to Poland, Latvia, Russia and Japan.

Acknowledgements

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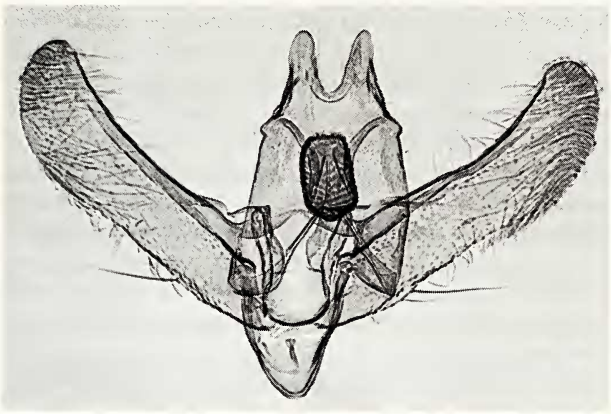

Fig. 5. *Elachista tengstromi* Kaila *et al.* ♂ genitalia (Austria, Sommerau, J. Klimesch leg., L. Kaila prep. no. 2991).

Fig. 6. *Elachista tengstromi* Kaila *et al.* aedeagus

Fig. 7. *Elachista regificella* Sircom. ♀ genitalia, neotype (U. K. England, Bristol, J. W. Tutt leg., B.M. slide 29769).

Fig. 8. *Elachista geminatella* (H.-S.). ♀ genitalia, neotype (Germany, nr. Bonn, Hering leg., L. Kaila prep. no. 2973).

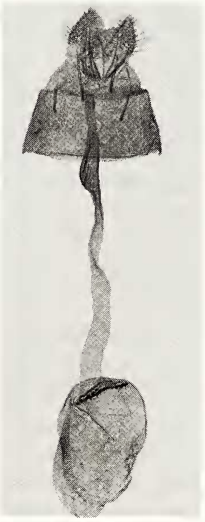

Fig.9. *Elachista tengstromi* Kaila *et al.* ♀ genitalia (Sweden, Gotland, Irevik, O. Karsholt leg., L. Kaila prep. no. 3251).